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Catherine B. Templeton, Director

Promoting and protecting the health of the public and the environment

May 8, 2012

Tom Wright, P.E., Wastewater Department Manager
Mount Pleasant Waterworks
P.O. Box 330
Mt. Pleasant, SC 29464

RE: Green Project Reserve Eligibility Determination
Mount Pleasant Waterworks / Center Street WWTP Capacity Enhancements
Charleston County
SRF No. 511-36

Dear Mr. Wright:

The Green Project Reserve (GPR) Business Case that was submitted on May 7th by e-mail from Black and Veatch for your State Revolving Fund (SRF) Clean Water project has been reviewed and is approved as presented. This approval is based on the decision criteria provided in the U.S. EPA's Technical Guidance. The project reviewed for GPR eligibility is summarized below:

> The project will provide various energy efficiency improvements at the Center Street Wastewater Treatment Plant as the plant's capacity is increased from 2.0 MGD to 3.7 MGD. Process upgrades (e.g., new pumps, blowers, motors, variable frequency drives, etc.) to the Influent Pumping System, Headworks Screening System, Equalization Basin and Anoxic Basins Mixing Systems, Secondary Clarifiers, and Waste Activated Sludge Mixing System all yield reductions in energy consumption greater than 20% (on a per MG basis). A new aeration system utilizing turbo aeration blowers mated to variable frequency drives is also planned that will replace the conventional constant speed positive displacement blower system. While a reduction in energy consumption could not be estimated, the Business Case shows that the proposed new system represents the most cost effective option after accounting for capital and annual power costs. Lastly, a new Supervisory Control and Data Acquisition (SCADA) system will be installed that will provide process-level control and feedback (including the energy usage of operating equipment) for each of the above-mentioned plant processes. This represents a new plant capacity that will certainly result in increased operating efficiency and reduced energy usage across the board (versus not having SCADA).
>
> Type of Green Project: Energy Efficiency
> Estimated Green Cost: $ 8,024,000
> Estimated SRF Loan: $ 25,373,000

May 8, 2012

At present the estimated SRF loan amount that can be covered by the green rate, based on your project estimate, is $8,024,000. The final amount eligible for the green rate will be determined once bids are opened and approved.

Thank you for incorporating green principles into the design of this SRF-eligible project. Should you have any questions, you may contact me at (803) 898-8178 or via e-mail at mccainjm@dhec.sc.gov.

Sincerely,

John M. McCain

John M. McCain, P.E., Project Manager
State Revolving Fund Section
Water Facilities Permitting Division
Bureau of Water

JMM/jmm

cc: George Bryan, Project Manager, SRF
Trish Comp, Budget and Control Board
Cyndi Madden, P.E., Black and Veatch
Jeff Wells, P.E., Black and Veatch
SRF Project File

BLACK & VEATCH
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Mount Pleasant Waterworks
Mount Pleasant, South Carolina
Center Street Wastewater Treatment Plant
Capacity Enhancements
Business Case for Green Project Reserve

B&V Project 169509
MPW Project STR1103
B&V File 14.5200
May 7, 2012

John McCain, P.E.
Bureau of Water – State Revolving Fund Section
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Dear Mr. McCain:

On behalf of Mount Pleasant Waterworks (MPW) we are submitting the revised enclosed Business Case for the 2011 Clean Water State Revolving Fund Green Project Reserve, for the above referenced project.

This revised Business Case incorporates the new SCADA system for the entire project. The SCADA system will extend to all plant processes and will include a power monitoring system which will monitor kilowatts, voltage, current, and amperes of all operating equipment.

We appreciate your review. Please don't hesitate to contact me at 864-449-7870 if you have any questions or need any additional information.

Very truly yours,
BLACK & VEATCH CORPORATION

W. J. Wells

Jeff Wells, P.E.
Associate Vice President
Senior Project Manager

Enclosure

cc: Mr. Tom Wright, P.E., MPW, w/encl.
Mr. George K. Bryan, SCDHEC, w/encl.

APPROVED - SCDHEC
WATER FACILITIES PERMITTING DIVISION
SRF NO. 511-36 DATE 5/8/2012
PROJECT Center St. WWTP Capacity Enhanceme
PROJECT ENGR. John M. McCain

BUSINESS CASE FOR
CLEAN WATER STATE REVOLVING FUND
GREEN PROJECT RESERVE

CENTER STREET WASTEWATER TREATMENT PLANT CAPACITY ENHANCEMENTS

Prepared for

Mount Pleasant Waterworks
Mount Pleasant, South Carolina

Prepared by

Black & Veatch Corporation
Charleston, South Carolina

Submitted: May 2012

I. CONTACT INFORMATION

Owner: Mount Pleasant Waterworks Operations Center
1619 Rifle Range Road
Mount Pleasant, SC 29465
(843) 971-7504
Contact: Mr. Tom Wright

Engineer: Black & Veatch Corporation
418 King Street, Suite 301
Charleston, SC 29403
(843) 266-0667
Contact: Mr. Jeff Wells, P.E., Project Manager

II. SERVICE AREA

Mount Pleasant has a residential population of approximately 64,000. MPW maintains a sewer collection area of approximately 60 square miles with 152 pump stations and 1.5 million feet of gravity sewer. The service area for Center Street Wastewater Treatment Plant (CSWWTP) is primarily a mixture of residential and commercial customers. Currently, flows to the CSWWTP are approximately 2.5 mgd maximum month daily average (MM) and 2.1 mgd AA.

III. NEEDS AND IMPROVEMENTS

The CSWWTP is currently permitted at 3.7 mgd, but is only capable of treating about 2.0 mgd due to the age and condition of the existing equipment. The CSWWTP Capacity Enhancements project will restore the treatment capacity of 3.7 mgd. The project will consist of the following improvements.

- Replacement of the influent pumps.
- New headworks screening equipment.
- Removal of the primary clarifier equipment.
- Conversion of the primary clarifiers to anoxic tanks.
- Removal of the existing aeration equipment.
- Replace fine bubble diffusers in the aeration basins.
- Installation of a blower building to house a new switchboard, and new aeration and solids holding tank blowers.
- Replacement of return activated sludge (RAS) pumps.

- Conversion of the aerobic digesters to aeration basins.
- Removal of the secondary clarifier equipment.
- Installation of two new secondary clarifiers.
- Conversion of two existing secondary clarifiers to WAS holding tanks.
- Replacement of the gaseous chlorine disinfection equipment with sodium hypochlorite disinfection.
- Replacement of the effluent pumps.
- Replacement of the existing engine generator.
- Removal of the existing laboratory administrative building.
- Improvements to the existing operation building.
- New laboratory administrative building at Rifle Range Road WWTP.

The existing site plan is shown in Figure III-1. The plant site location is shown in Figure III-2.

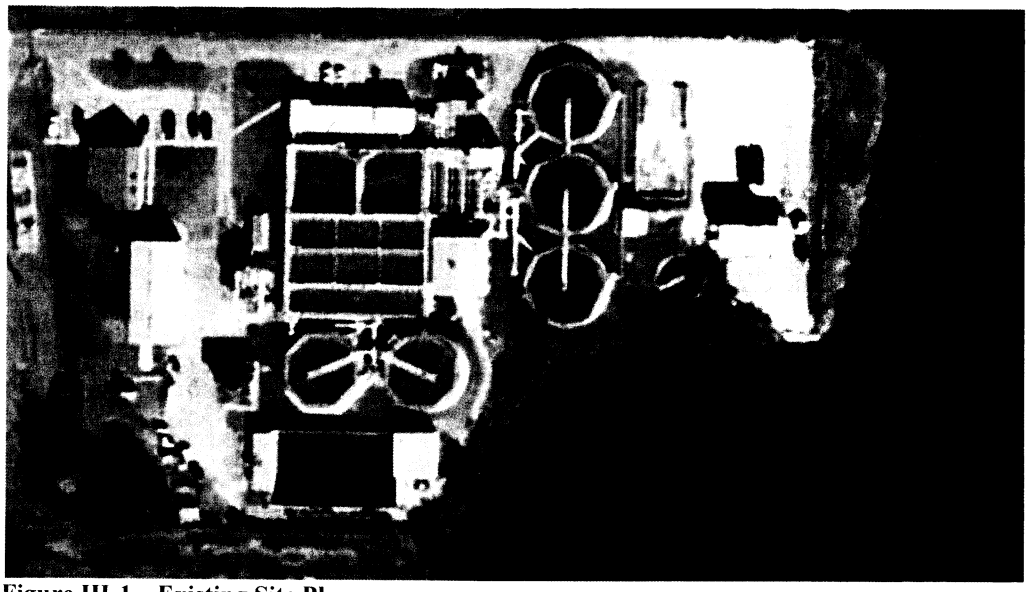


Figure III-1 – Existing Site Plan

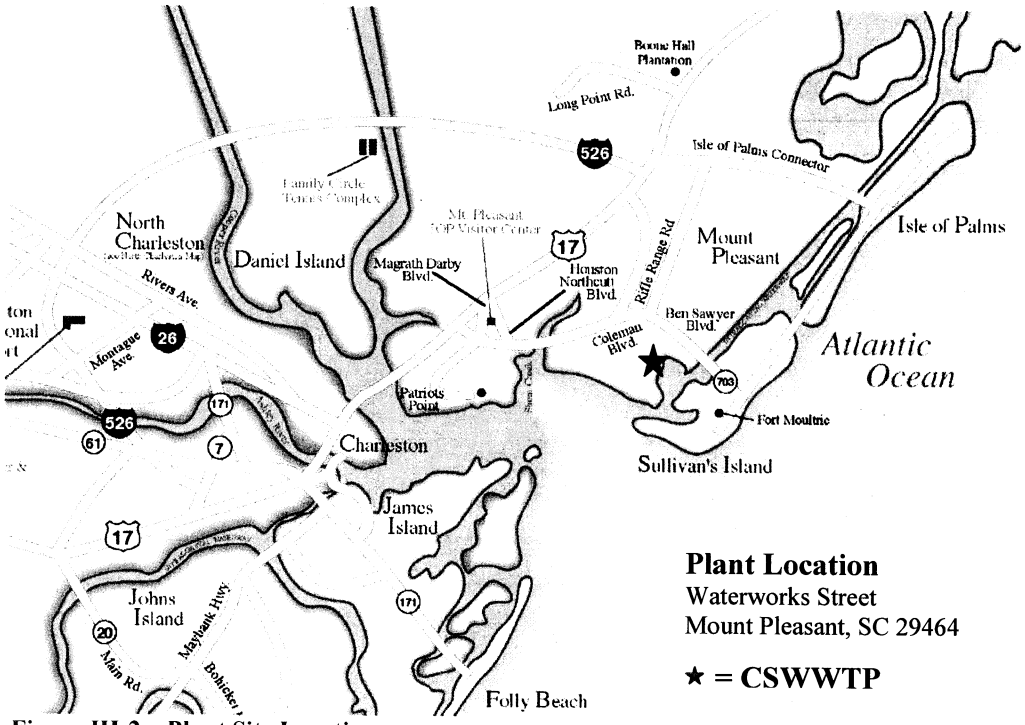


Figure III-2 – Plant Site Location

IV. Energy Efficiency Components

The components of the CSWWTP Capacity Enhancements project which fall under Section 3.0 "Energy Efficiency" eligible projects for the 2011 Clean Water and Drinking Water State Revolving Fund 20% Green Project Reserve are listed below.

1. Influent Pumping System

The three existing influent pumps (2 duty / 1 standby) are being replaced with new pumps in order to handle the peak hour flow mandated by the South Carolina Department of Health and Environmental Control. The new pumps are more energy efficient and will decrease the overall power demand per gallon of water. The increased energy efficiency is as shown below.

	Existing Influent Pumps	New Influent Pumps
AFD efficiency, %	90	90
Motor efficiency, %	90.8	94.5
Pump efficiency, %	73.2	77.0
Overall efficiency, %	59.8	65.5
Increased efficiency, %	---	**9.5**

The new influent pumps will provide reduced power consumption per gallon as indicated below.

	Existing Influent Pumps	New Influent Pumps
Drive type	Adjustable frequency	Adjustable frequency
Quantity	2 duty + 1 standby	2 duty + 1 standby
Horsepower, each	50	60
kW, each	51.2	60.28*

*kW = (motor hp x 0.746) / (motor efficiency x AFD efficiency x AFD power use factor)

The power consumption per gallon of wastewater is as calculated below, and applies to each unit process analysis which follows in this report.

$$\text{Power consumption per MG} = \frac{\#\ of\ pumps\ at\ plant\ capacity\ per\ day * kW/pump}{Plant\ capacity\ per\ day}$$

Existing Influent Pumps:

$$\text{Power consumption per MG} = \frac{1\ pump * 51.2\ kW/pump}{2.0\ MG} = 25.6\ kW/MG$$

New Influent Pumps:

$$\text{Power consumption per MG} = \frac{1\ pump * 60.28\ kW/pump}{3.7\ MG} = 16.3\ \text{kW/MG}$$

This yields a decrease in the power consumption per MG from 25.6 kW/MG to 16.3 kW/MG which is a reduction of **36**%.

2. Headworks Screening System

The existing mechanical channel screen and screw conveyor are being replaced with a new center flow band screen and screenings processor. The new equipment will have an increased efficiency and a reduction in power consumption as shown below.

EXISTING EQUIPMENT		NEW EQUIPMENT	
Channel Screen		Center Flow Band Screen	
Quantity	1 duty	Quantity	1 duty
Quantity operating at 2.0 MGD	1	Quantity operating at 3.7 MGD	1
Horsepower, each	1	Horsepower, each	1
kW, each	0.95*	kW, each	0.87*
Motor efficiency, %	78.5	Motor efficiency, %	85.5
Increased efficiency, %			**8.9**
Screw Conveyor		Screenings Processor	
Quantity	1 duty	Quantity	1 duty
Quantity operating at 2.0 MGD	1	Quantity operating at 3.7 MGD	1
Horsepower, each	5	Horsepower, each	3
kW, each	4.21*	kW, each	2.5*
Motor efficiency, %	88.5	Motor efficiency, %	88.5 to 89.5
Increased efficiency, %			**0 to 1**

* kW = (motor hp x 0.746) / motor efficiency

The new screening equipment will provide reduced power consumption per gallon of wastewater treated as indicated below.

Existing Channel Screen:

$$Power\ consumption\ per\ MG = \frac{0.95\ kW}{2.0\ MG} = 0.48\ \text{kW/MG}$$

New Center Flow Band Screen:

$$Power\ consumption\ per\ MG = \frac{0.87\ kW}{3.7\ MG} = 0.24\ \text{kW/MG}$$

A decrease in the power demand per MG of wastewater treated from 0.48 kW/MG to 0.24 kW/MG is a reduction of **50**%.

Existing Screw Conveyor:

$$Power\ consumption\ per\ MG = \frac{4.21\ kW}{2.0\ MG} = 2.11\ \text{kW/MG}$$

New Screenings Processor:

$$Power\ consumption\ per\ MG = \frac{2.5\ kW}{3.7\ MG} = 0.68\ \text{kW/MG}$$

A decrease in the power demand per MG of wastewater treated from 2.11 kW/MG to 0.68 kW/MG is a reduction of **68**%.

3. BioMix™ Mixing System at Equalization Basin and Anoxic Basins

An AFD driven compressed air and submerged air nozzle mixing (EnviroMix BioMix™ or equal) system will replace the existing constant speed blower and coarse bubble diffuser mixing system at the flow equalization (EQ) basin. The BioMix™ system will also be installed in the primary clarifiers which are being converted to anoxic basins. Therefore the BioMix™ system is replacing both the EQ blower mixing system and the primary clarifier equipment, which results in a significant reduction in energy consumption as shown below.

Additionally, the BioMix™ system is a very innovative approach to treatment which promises to have not only reduced energy costs, but also a significant reduction in operations costs due to reduced maintenance and no chance of losing a submerged motor (as compared to submersible mixers often used for these applications).

EXISTING EQUIPMENT		NEW EQUIPMENT	
EQ mixing blowers		BioMix™ compressors	
Drive type	Constant speed	Drive type	Adjustable frequency
Quantity	2 duty + 1 standby	Quantity	1 duty + 1 standby
Quantity operating at 2.0 MGD	2	Quantity operating at 3.7 MGD	1
Horsepower, each	30	Horsepower, each	25
kW, each	24.1*	kW, each	26.2**
kW, subtotal running at 2.0 MGD	48.2	kW, subtotal running at 3.7 MGD	26.2
Primary clarifier equipment			
Quantity	2 duty		
Quantity operating at 2.0 MGD	2		
Horsepower, each	0.5		
kW, each	0.48*		
kW, subtotal running at 2.0 MGD	0.96		
kW, total running at 2.0 MGD	49.16	kW, total running at 3.7 MGD	26.2

*kW = (motor hp x 0.746) / motor efficiency

**kW = (motor hp x 0.746) / (motor efficiency x AFD efficiency x AFD power use factor)

The new BioMix™ equipment will provide a reduction in power consumption per gallon of wastewater treated as indicated below.

Existing Equipment:

$$Power\ consumption\ per\ MG = \frac{49.16\ \text{kW}}{2.0\ MG} = 24.6\ \text{kW/MG}$$

New Bio-Mix equipment:

$$Power\ consumption\ per\ MG = \frac{26.2\ kW}{3.7\ MG} = 7.1\ \text{kW/MG}$$

A decrease in the power demand per MG of wastewater treated from 24.6 kW/MG to 7.1 kW/MG is a reduction of **71**%.

4. Aeration Blowers

In order to meet more stringent effluent limits and to restore the plant's treatment capacity to 3.7 mgd (Annual Average), a new nitrification/denitrification biological process is being added to the facility. The new nitrification/denitrification process includes new adjustable frequency, high speed gearless turbo aeration blowers. This new process is replacing the existing conventional activated sludge (CAS) biological process consisting of a constant speed positive displacement blower system, which is only capable of meeting current effluent limits at 2.0 mgd. The new high speed gearless turbo aeration blowers will be installed in a new blower building.

The high speed gearless turbo blowers are an emerging technology that allows for greater turn-down and control of the airflow and therefore better performance and reduced power consumption.

The nitrification/denitrification system is a new process and therefore the high speed gearless turbo blowers are not being compared to the existing CAS process equipment. However, this business case will demonstrate that new high speed gearless turbo blowers were chosen because they are the most cost-effective of all blower options available.

The characteristics of the new high speed gearless turbo blowers are indicated below.

NEW HIGH SPEED GEARLESS TURBO AERATION BLOWERS	
Drive type	Adjustable frequency
Quantity	3 duty + 1 standby
Horsepower, each	114
kW, each	96.85
kW, total running	290.55
Motor efficiency type	Premium efficiency

In an early design stage of the project, a blower evaluation was performed which considered the following types of blowers used for this application.

- Alternative 1 - Multistage Centrifugal
- Alternative 2 - Traditional Single Stage
- Alternative 3 – High Speed Gearless Turbo
- Alternative 4 - Rotary Positive Displacement

Rotary positive displacement blowers were not evaluated since they are much less efficient than the other alternatives and not cost effective in the size range required for this project.

Equipment Costs

Budget quotes were received from vendors to determine the following equipment capital costs.

Capital Costs for Aeration Blowers	
Blower Alternatives	**Total Blower Capital Cost**
Alternative 1 - Multistage	$321,000
Alternative 2 – Traditional Single Stage	$679,000
Alternative 3 – High Speed Gearless Turbo	$553,000

Annual Operating Costs

Annual operating costs were determined considering various operating conditions and their durations throughout the year and the corresponding blower operating horsepower.

The power consumption was multiplied by a unit power cost of $0.0675/kWh to determine the annual power cost. The annual power costs for the aeration blowers are as follows.

Annual Power Costs for Aeration Blowers	
Blower Alternatives	**Power Cost**
Alternative 1 - Multistage	$105,000
Alternative 2 - Traditional Single Stage	$71,000
Alternative 3 – High Speed Gearless Turbo	$76,000

Present Worth Evaluation

To compare the options, a present worth evaluation was conducted for each option. This present worth was based on the initial capital costs and the annual operating costs. The annual operating costs were converted into present dollars assuming a 5% interest rate and 20 year period. The present worth operating (power) costs for aeration blowers are as follows.

Present Worth Power Costs For Aeration Blowers	
Blower Alternatives	**Present Worth of Power Cost**
Alternative 1 - Multistage	$1,309,000
Alternative 2 - Traditional Single Stage	$879,000
Alternative 3 – High Speed Gearless Turbo	$952,000

Summary and Conclusions

A summary of total present worth for each blower alternative is shown below. The total present worth is the sum of the capital costs and the present worth power costs.

Total Present Worth for Aeration Blowers				
Blower Alternatives	**Capital Cost**	**Present Worth of Power Cost**	**Total Present Worth**	
Alternative 1 - Multistage	$321,000	$1,309,000	$1,630,000	8% Higher
Alternative 2 - Traditional Single Stage	$679,000	$879,000	$1,558,000	4% Higher
Alternative 3 – High Speed Gearless Turbo	$553,000	$952,000	$1,505,000	Lowest

The high speed gearless turbo blowers are demonstrated to be the most cost effective of all alternatives. Another advantage of the high speed gearless turbo blowers are that they are offered by more manufacturers than traditional single stage blowers which allows for more competitive bidding. Additionally, they have the smallest footprint of all alternatives which results in a lower building cost. Therefore, Alternative 3 – High Speed Gearless Turbo Blowers was selected.

5. Secondary Clarifiers

New secondary clarifiers are being provided to increase the treatment capacity of the plant. The new clarifiers will provide reduced power consumption per gallon of wastewater treated compared to the existing secondary clarifying equipment as indicated below.

EXISTING CLARIFIERS		NEW CLARIFIERS	
Drive type	Constant speed	Drive type	Adjustable frequency
Quantity, duty	3	Quantity, duty	2
Horsepower, each	0.75	Horsepower, each	0.5
kW, each	0.73*	kW, each	1.18**
		Motor efficiency type	Premium efficiency

*kW = (motor hp x 0.746) / motor efficiency

**kW = (motor hp x 0.746) / (motor efficiency x AFD efficiency x AFD power use factor)

Existing Clarifiers:

$$Power\ consumption\ per\ MG = \frac{3\ \text{clarifiers} * 0.73\ kW/clarifier}{2.0\ MG} = 1.1\ \text{kW/MG}$$

New Clarifiers:

$$Power\ consumption\ per\ MG = \frac{2\ \text{clarifiers} * 1.18\ \text{kW/clarifier}}{3.7\ MG} = 0.6\ \text{kW/MG}$$

A decrease in the power demand per MG of wastewater treated from 1.1 kW/MG to 0.6 kW/MG is a reduction of **41**%.

6. Waste Activated Sludge (WAS) Mixing System

A waste activated sludge (WAS) mixing system consisting of coarse bubble diffusers and an AFD driven blower system will replace the existing aerobic digestion system consisting of fine bubble membrane disk diffusers and a constant speed blower system. The existing secondary clarifiers will be converted to serve as the WAS holding tanks. The energy consumption of the new WAS mixing blowers will be much less than that of the existing blowers.

EXISTING AEROBIC DIGESTER BLOWERS		NEW WAS MIXING BLOWERS	
Drive type	Constant speed	Drive type	Adjustable frequency
Quantity	2 duty + 1 standby	Quantity	2 duty + 1 standby
Horsepower, each	100	Horsepower, each	50
kW, each	79.7*	kW, each	51.2*
Motor efficiency, %	93.6	Motor efficiency	Premium; 93% to 94.5%

*kW = (motor hp x 0.746) / motor efficiency

**kW = (motor hp x 0.746) / (motor efficiency x AFD efficiency x AFD power use factor)

The new WAS mixing blowers will provide a reduction in power consumption per gallon of wastewater treated as indicated below.

Existing Aerobic Digester Blowers:

$$Power\ consumption\ per\ MG = \frac{2\ blowers * 79.7\ \text{kW/blower}}{2.0\ MG} = 79.7\ \text{kW/MG}$$

New WAS Mixing Blowers:

$$Power\ consumption\ per\ MG = \frac{2\ blowers * 51.2\ kW/blower}{3.7\ MG} = 27.7\ \text{kW/MG}$$

A decrease in the power demand per MG of water treated from 79.7 kW/MG to 27.7 kW/MG is a reduction of **65%**.

V. Additional Information

1. Additional Motor Information

Other information pertaining to the CSWWTP Capacity Enhancements project, which strengthens this business case is as follows.

- Use of adjustable frequency drives (AFDs)
- Use of premium efficient motors

Nearly every motor discussed in this business case will be driven by adjustable frequency drives (AFDs). The use of AFDs will allow the plant to operate more efficiently at any given flow. The power demand values represented in this report do not take into account the ability to turn down the equipment motor speed. Therefore, in cases where new equipment with AFDs is replacing existing equipment with constant speed motors, at average conditions, the reduction in power consumption will be even greater than the values listed in this business case.

Additionally, new equipment motors will have premium efficiency, when available, such that energy efficiency will be maximized.

2. Existing Motor Information

The performance data for existing equipment included in this business case was recorded directly from the motor nameplates, except in cases where the equipment is inaccessible (i.e. submersible pumps). Performance data was taken from the operation & maintenance manuals in cases where the equipment is inaccessible.

3. SCADA System

A new Supervisory Control and Data Acquisition (SCADA) system will be installed, which will incorporate a power monitoring system into the new plant control system. The power monitoring system will allow the operators to monitor kilowatts, voltage, current, and amperes of all operating equipment. The plant does not currently have a SCADA system.

VI. Project Costs

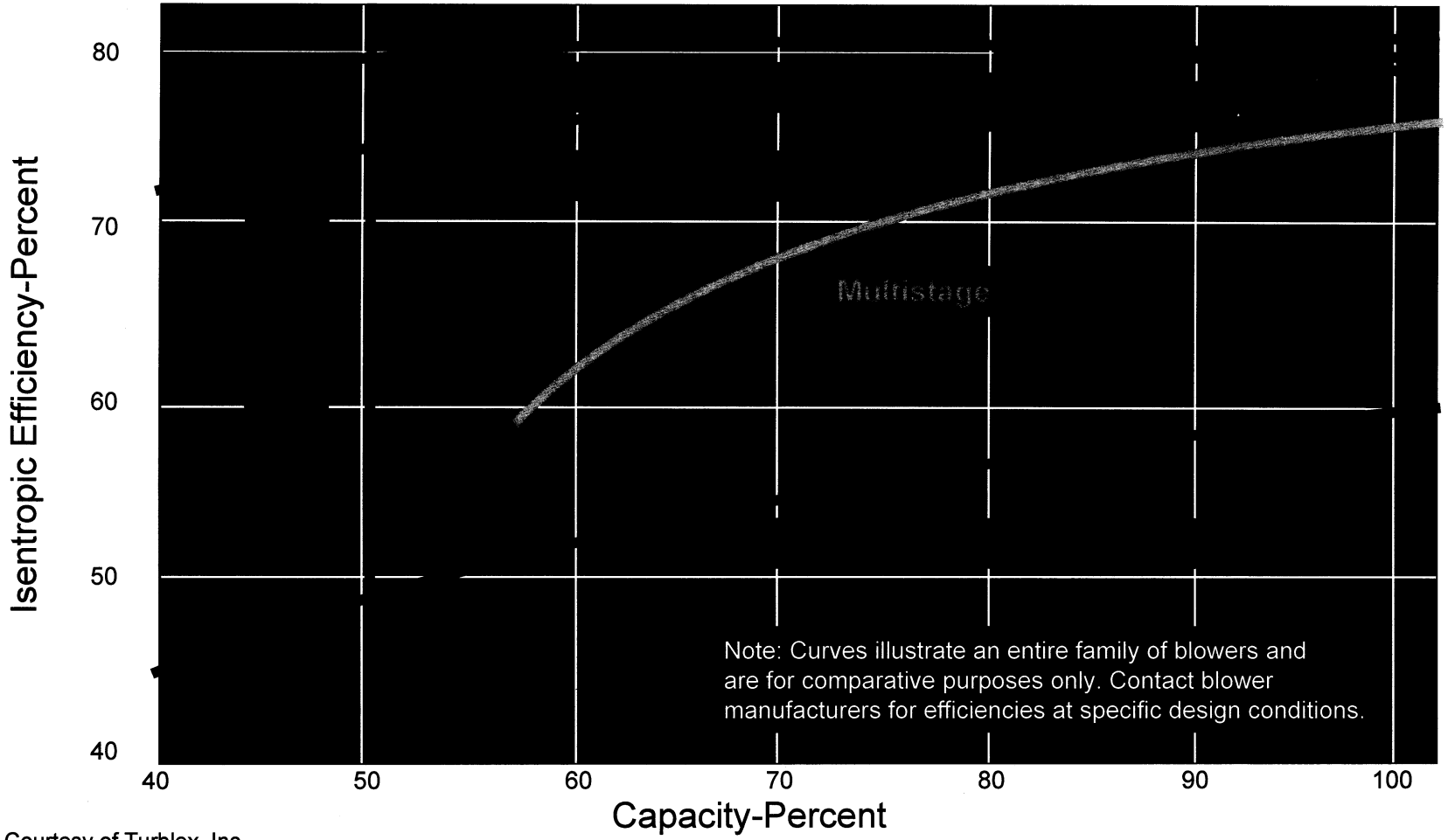
The total opinion of probable cost for the CSWWTP Capacity Enhancements project is $25,373,000.00. This business case discusses various components of the project which are eligible under the Energy Efficiency section of the 2011 Clean Water and Drinking Water State Revolving Fund 20% Green Project Reserve. Therefore, funding for these components, in the total amount of $8,024,000.00 is requested as outlined below.

	Dollars ($)
1. Influent Pumps	
Purchase & Install Influent Pumps (excludes cost of AFDs)	374,000
Electrical	19,000
General Requirements and OH&P	79,000
2. Headworks Screening Equipment	
Purchase & Install Center Flow Band Screen & Screenings Processor	689,000
Electrical	35,000
General Requirements and OH&P	145,000
3. BioMix Equipment for Equalization Basin and Anoxic Basins	
Purchase & Install BioMix Equipment	528,000
Electrical	27,000
General Requirements and OH&P	111,000
4. Aeration Blowers	
Purchase & Install Turbo Blowers & Diffuser Equipment	1,933,000
Electrical	98,000
General Requirements and OH&P	407,000
5. Secondary Clarifier Equipment	
Purchase & Install Clarifier Equipment	701,000
Electrical	36,000
General Requirements and OH&P	148,000

	Dollars ($)
6. Waste Activated Sludge (WAS) Mixing Equipment	
Purchase & Install WAS Mixing Blowers & Diffuser System	492,000
Electrical	25,000
General Requirements and OH&P	104,000
7. SCADA System	
Purchase & Install SCADA System (Instrumentation & Control)	650,000
General Requirements and OH&P	130,000
SUBTOTAL	6,731,000
Engineering, Legal, and Administrative	1,293,000
TOTAL PROBABLE EQUIPMENT COST (2012 Dollars)	**8,024,000**

Efficiency Comparison

Efficiency vs. Turndown of Various Blowers (Compressors)



Courtesy of Turblex, Inc.

COST COMPARISON SPREADSHEET
Center Street WWTP
Blower Evaluation

	2011
Summer Power Cost	0.068
Winter Power Cost	0.068

Eval. Time period	20.0
Frequency of use	100%

Operating & Maintenance Costs	Multistage Blowers, Inlet throttled	Single Stage Turblex Blowers	High Speed Turbo Blowers (Neuros)
Condition 1 - Summer temp and Max. Month flow			
Inlet Temperature	100	100	100
Total Rated Air Flow (scfm), each Blower	2,340	2,340	2,340
Total Required Air Flow	6,999	6,999	6,999
No. of Units Operating	3	3	3
Airflow per unit, scfm	2,333	2,333	2,333
Operating Hp Per Unit	122	96	97
Total Operating Hp	367	287	291
% of the Year	9%	9%	9%
Condition 2- Avg Temp, Average Flow			
Inlet Temperature	64	64	64
Total Required Air Flow	3,936	3,936	3,936
No. of Units Operating	2	2	2
Airflow per unit, scfm	1,968	1,968	1,968
Operating Hp Per Unit	109	72.2	79.248
Total Operating Hp	218	144	158
% of the Year	83%	83%	83%
Condition 3- Winter Temp, Max. month flow			
Inlet Temperature	25	25	25
Total Required Air Flow	4,836	4,836	4,836
No. of Units Operating	3	3	3
Airflow per unit, scfm	1,612	1,612	1,612
Operating Hp Per Unit	95	56.6	61.152
Total Operating Hp	286	170	183
% of the Year	9%	9%	9%
Annual Power Consumtion, kwh	1,544,914	1,037,023	1,123,285
Total Annual Power Costs	$105,054	$70,518	$76,383